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THE BIRTH OF INVENTION.

By PROFESSOR OTIS T. MASON, PH. D., OF VIRGINIA, CURATOR  
U. S. NATIONAL MUSEUM.











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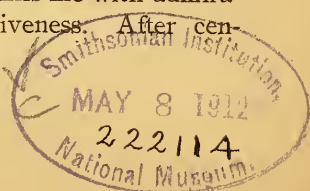
"What a plastic little creature man is! so shifty, so adaptive! his body a chest of tools, and he making himself comfortable in every climate, in every condition."—*Emerson*.

In this apotheosis of invention and inventors, to me has been assigned the pleasing task of leading you back for a few moments to the cradle of humanity. Those are happy hours to most of us when we recall the days of childhood. To trace the lives of celebrated men and women to the springs of their moral and intellectual power brings never-fading delight. To study the rise and progress of a nation or any social unit is worthy of exalted minds. But the most profitable inquiry of all is the search for the origin of epoch-making ideas in order to comprehend the history of civilization, to conjure up those race memories in which each people transmits to itself and to posterity its former experiences.

Every invention of any importance is the nursery of future inventions, the cradle of a sleeping Hercules. But my task is to speak of primitive man and his efforts.

It will aid us in prosecuting our journey backward to orient ourselves with reference to the present. For two days we have listened to the eloquent papers of my predecessors, written to glorify the nineteenth century. Through this faculty of invention the whole earth is man's. There is not a lone island fit for his abode whereon some Alexander Selkirk has not made a home. Every mineral, plant and animal is so far known that a place has been found for it in his *Systema Naturæ*. Every creature is subject to man; the winds, the seas, the sunshine, the lightning do his bidding. Projecting his vision beyond his tiny planet, this inventing animal has catalogued and traced the motion of every star.

But his crowning glory (which always fills me with admiration) is his ever-increasing comprehensiveness.



turies of cultivating acquaintance with the discrete phenomena around him, he has now striven to coördinate them, to make them organic, to read system into them. He has learned by degrees to comprehend all things as parts of a single mechanism. Sir Isaac Newton and Kepler conceived all objects and all worlds to be held by universal gravitation. And thus, in our century, von Baer and Humboldt taught that the world, in all its forces and materials, is an integrated cosmos. Any one who is the least familiar with the progress of philosophy will recall that since the dawn of written history the thoughts of men were tending to this unification. Shortly after this first effort at comprehensive unity Mayer, Rumford and Joule invented the methods of demonstrating the oneness of physical forces, the conservation of energy. Wollaston, Kirchoff and Bunsen devised the delicate apparatus to prove the chemical identity of all worlds. Lamarck, Geoffroy St. Hilaire and Darwin taught the consanguinity of all living beings. Helmholtz and Meyer coördinated nervous excitation with mental activity. Comte and Spencer grasped the unity of all sensible phenomena. Newton, Leibnitz and Hamilton projected their minds beyond phenomena and invented mathematics of four or more dimensions, conceiving of worlds and systems that under the present order of nature can have no objective reality. Over all this, into many great souls, have come the notions of infinite space and time and causation. The idea of limitation to thought or achievement no longer enters the imagination. The depth of the sea, the distances of the stars, the concealment of the earth's treasures, the minuteness of the springs of life and sense, the multiplicity and complicity of phenomena are only so many incitements to greater achievements. The daring souls of this decade are determined at any risk to answer the inquiry of Pontius Pilate, What is truth? With sympathetic enthusiasm we wave them on, bidding them god-speed.

But, I ask you now to forget all this and go with me to that early day when the first being, worthy to be called man, stood upon this earth. How economical has been his endowment. There is no hair on his body to keep him warm, his jaws are the feeblest in the world, his arm is not equal to that of a go-



rilla, he cannot fly like the eagle, he cannot see into the night like the owl, even the hare is fleetier than he. He has no clothing, no shelter. "Foxes had holes, and the birds of the air had nests, but this man had not where to lay his head." He had no tools or industries or experience, no society or language or arts of pleasure, he had yet no theory of life and poorer conceptions of the life beyond.

All nature laughed at him. The sun said, I will blister his skin. The storm said, I will spit upon him. The sea said, I will drown him. The noxious malaria said, I will parch him with fevers. The lion, the wolf, the tiger said, I will devour him. The mountain sheep withheld her fleece and lambs. The wild ass and the wild horse fled away in scorn. The silly fish said, I know you not, and the birds skimmed the air around him in mockery. There were no waving grain fields, nor golden cornfields, nor tempting vineyards, nor fragrant orchards.

"Poor naked wretches, on the edge of time,  
That bide the pelting of this pitiless storm,  
How shall your houseless heads and unfed sides defend you  
From seasons such as these?"

*King Lear, iii, 1.*

Whatever we may say of our own golden age, surely his was not around him nor above him. If he had one at all it was within him.

"Heaven flowed upon the soul in many dreams of high desire."

—Tennyson, "THE POET,"

The road from that condition to our own lies next to the infinite. The one endowment that this creature possessed having in it the promise and potency of all future achievements, was the creative spark called *invention*. The superabundant brain over and above all the amount required for mere animal existence, held in trust the possibilities of the future, and stamped upon man the divine likeness. This naked ignoramus is the father of the clothed philosopher, looking out into infinite space and time and causation. It may give you pleasure to know something about the connections between these two and the witnesses to these connections.

There are five guides whose services we have to engage on our interesting journey. The first is History, who does not know the way very far back—not over three thousand years—with much certainty. The second is Philosophy, the study of which in our own century has enabled us to find the cradle-land of many peoples. The third is Folk-Lore, the survival of belief and custom among the uneducated. The fourth is Archæology, history written in things. The fifth is Ethnology, which informs us that in describing this arc of civilization some races have only marked time, while others have moved with radii of varying lengths. The result of this is that we now have on the earth types of every sort of culture it has ever known. At the present moment, within hailing distance of yonder most beautiful dome in the world dwell all these witnesses—the relics of the stone age, the Indian village of Nacochtank or Anacostia, the folk-lore of both continents, and the literatures of the world. While you are listening to the encomiums of our decade, palæolithic man sends in the testimony of his handicraft, the Smithsonian Institution treasures the inventions of the most primitive races, and the Bureau of Ethnology unravels the mysteries of savage tongues.

As the fragment of a speech or song, a waking or a sleeping vision, the dream of a vanished hand, a draught of water from a familiar spring, the almost perished fragrance of a pressed flower, call back the singer, the loved and lost, the loved and won, the home of childhood, or the parting hour, so in the same manner there linger in this crowning decade of the crowning century bits of ancient ingenuity which recall to a whole people the fragrance and beauty of its past.

From the testimony of these five witnesses we learn that there never was a time when man was not an inventor—never a time when he had not some sort of patent on his invention. They affirm that every art of living and all the arts of pleasure were born in the stone age; that graphic art, sculpture, architecture, painting, music and the drama, had their childish prototypes in that early day; that language is one of the very earliest of inventions, the vehicle of savage oratory, philosophy and science. They affirm that society has been a series of inventions from the first; that legislation, justice, government,

property, exchange, commerce, have not sprung out of the ground but within our definition are inventions. And even the creeds and cults of mankind, whatever view you may take of the divine element underneath them, have been thought out and wrought out with infinite pains from time to time by earnest souls. But they had their origin in the cradle-land and in the infancy of our race. What we enjoy is only the full-blown flower, the perfected fruit of which they possessed the germ. Let me enforce this idea, as we glorify the material prosperity of the nineteenth century, that many centuries ago men sat down and with great pains and sorrow invented the language, the art, the industries, the social order which made our machines feasible and desirable.

There is no conflict between the testimony of these witnesses and the doctrine commonly taught that men do not invent customs and languages, but fall into them. Reflect a moment upon your own daily life and you will recognize two sets of activity, those which you originate and those in which you follow suit. Animals can learn to follow suit, and to a very limited extent can originate. But it is the divine spark of originality which underlies every thought or device in this world. As one man invents a machine and others by thousands fall into the use of it, as the musician composes a song and millions sing it, so was it in the cradle-land of humanity, the inventor, touched with fire from the divine altar, set new examples to be followed. If we were to interrogate our five witnesses particularly with reference to the ancestry, the family tree of the notable inventions of the nineteenth century, their answer would be somewhat as follows. We ought to remember, however, that an invention is not always a thing ; but that it may be any series of actions conducing toward some new end. Keep in mind, also, that all our activities involve tools, processes and products, and that invention may take place in any or all of these.

The ancestor of the steam plow is the digging-stick of savagery, a branch of a tree sharpened at the end by fire ; the progenitors of the steam harvester and thresher were the stone sickle, the roasting-tray, or, later on, the tribulum.

The cotton gin and power loom are among the wonders of our age. Yet in that day of which we are speaking human fingers wrought the textile from first to last. They gathered the bark or wool, colored them to suit the primitive taste, spun and wove them with simple apparatus and left upon the fabric patterns that are the despair of all modern machine-makers—patterns that are a pleasure to the eye by their infinite variety, replaced in modern fabrics by a dreary monotony that awakens pain instead of pleasure.

The first sewing-machine was a needle or bodkin of bone, with dainty sinew thread from the leg of the antelope, and for thimble a little leather cap over the ends of the fingers. Coarse, indeed, the apparatus, but the hand was deft, the eye was true, the sense of beauty was there, and so that needlewoman of long ago wrought in fur from the mammals, feathers from the birds, grasses from the fields, shells from the sea, wings from the beetle and skins of snakes, with tasteful geometric figures. You do err who think those ancient needlewomen had no taste. It would be hard to invent a pattern now that was unfamiliar to them.

The first engine was run by man power, then man subdued the horse, the ass, the camel and invented engines for those to propel. He next domesticated the winds, the waters, the steam, the lightning, but the first common carriers and machine power were men and women. The first burden train was women's backs ; the first passenger car was a papoose frame. And even now, while I am speaking to you, more heavy loads are resting on human shoulders than upon all the pack animals in the world. Hence our nursery rhyme—

Rock a by baby on a tree top,  
When the wind blows  
The cradle will rock.  
When the bough bends,  
The cradle will fall.  
Down will come cradle,  
And baby and all.

The poetry of to-day is the fact of yesterday, the dream of yesterday is the fact of to-day. When the savage woman a century or two ago, upon this very spot, strapped her dusky



offspring to a rude frame, hung it upon the nearest sapling for the winds to rock, or lifted the unfortunate suckling from the ground to which it had been hurled by the bending of an unsafe bough, that was a fact, a stage in the history of invention. In our now-a-days couches of down, swung from gilded hinges, we have got far ahead of the papoose cradle, the memory of which we perpetuate in nursery rhymes sung to children, who wonder why babies should be hung in the tops of trees and think, doubtless, that the falling cradle was a just retribution on the silly parents.

What is more beautiful than an ocean steamer, with skin of steel drawn over ribs of steel and closed above against the intrusion of the waves. Have you never seen the picture of the Eskimo, still in the stone age, who, over a framework of drift wood or whale's rib, stretches a covering of sealskin and learned therein to defy the waves hundreds of years ago?

Only now and then the angry sky was lighted for the primitive man by electricity, and even then it filled him with terror. But it was he that invented the apparatus for conjuring from dried wood, by a rude sort of dynamo, the Promethean spark. It was our Aryan ancestors that paid their devotions to the rising sun by kindling fresh fire every morning as the orb of day flashed his first beam across the earth.

Who has not read with almost breaking heart the story of Palissy, the Huguenot potter. But what have our witnesses to say of that long line of humble creatures that conjured out of prophetic clay, without wheel or furnace, forms and decorations of imperishable beauty, which are now being copied in glorified material in the best factories of the world? In ceramic as well as in textile art the first inventors were women. They quarried the clay, manipulated it, constructed and decorated the ware, burned it in a rude furnace and wore it out in a hundred uses.

He had no printing press, but he could tie knots in a marvelous fashion and write letters on bark or on bits of raw hide and leave memorials of himself in the book of stone. He made words and sentences, invented language, developed artistic forms of speech handed down to us in the eloquent

harangues of his sages. He breathed his thoughts in poetry, a kind of childish rhythm.

In the time of which we now are speaking the telegraph was a series of signal fires and a marvelous code of signs, which a distinguished scholar of our city has just unraveled.

Primitive man developed the art of war, means of offense and defense ; weapons of percussion, for cutting and thrusting ; projectiles, armor, fortification, strategy.

Nowhere has man pressed his hand so effectively upon nature as in the domestication of animals. It is almost incredible that ravening wolves and merciless felines should become faithful dogs and purring cats ; that the wild sheep and goat should descend from their inaccessible fastnesses, and yield their fleece and flesh and milk ; that horses, asses, camels, elephants, should be induced to lend their backs and limbs to lighten the loads of the first common carrier. This process of impressing his own qualities on wild creatures began very early in history and has continued uninterruptedly from first to last.

In the uncertainty of the marriage relation and of paternity, he provided every woman with support and every child with a home, through his ingenious gentile system.

His affairs of state were managed through his patent system. The great inventors were made the rulers of the people, and his highest title to nobility was a most puissant and ingenious one.

He had courts of justice, heard witnesses, executed his laws. It is true that the methods were summary, when a chancery suit was settled by an execution on the same day as the death of the devisor. But out of his struggles came our methods, and the greatest drawback to securing justice now is the survival of his antiquated customs into our new practices.

He invented philosophies and sciences, explained the universe and himself to himself. This seems puerile now, but it was the beginning of all our own speculations, necessary to us at present, but which will to-morrow become folk-lore. Over and over again, those who preceded me on this platform have pointed to James Watt as the true deliverer of mankind. Far be it from me to take one leaf from his laurel crown ; but the inventor of the alphabet, of the decimal system of notation, of

representative government, of the golden rule in morality, were greater than he.

For the dream in stone and carving and decoration called a cathedral,

“Where, through long-drawn aisle and fretted vault,  
The pealing anthem swells the notes of praise,”

that early day has only to offer wild shouts in unison under the starlit dome, touched by the first childish aspirations after the divine or hopes of immortality.

While you look with admiration upon these panoramas of progress you cannot have failed to observe on the canvas that the art, the process of inventing itself, has undergone the very same development and improvement as the things invented. There is in this a marvelous similarity to the life processes of animals and plants. The homogeneous yolk of the egg during incubation becomes wonderfully complex and heterogeneous; but all of these diverse parts come together into a higher unity, in which each organ ministers to the good of all. The earliest invention was a single homogeneous act, an original suggestion, a happy thought. The patent on this was an immediate and individual benefit. A sharper knife of flint, a better scraper, a longer spear, a stouter thread wrought better, and the reward was more execution. Now, the man who made the best weapons killed the most game, from that game he got better food, that food made him stronger, that strength made him chief, that chieftaincy gave him more wives, more children, more cohorts to support his throne. The best woman to cook or sew or carry loads got the best husband; that was her patent. From these simple methods of inventing and rewarding invention we come on to the Olympic games, the monopolies, the patent system. And now, in the inventor's laboratory of Graham Bell or Edison the climax is reached, where one machine is the coöperative result of any number of trained minds, and the reward is meted out to each by the manufacturer; or, in this Patent Congress itself, we may have a still more highly organized unit, wherein the inventors of America become a body social, and together shake hands under the sea with the Emperor of Germany, who sends his congratulations to-day on the occasion of our meeting.

We are assembled to glorify the first century of American patents. A few months ago the disciples of Daguerre met in our city and set up in the National Museum a monument to the inventor of photography. I do not know that there is another memorial in America to an inventor. There is no better way to insure for posterity the recollection of this day than by stimulating among the great industries the desire to continue this good work of memorializing their founders. Perhaps you may not build your monument of stone or bronze, you may set up a library, you may solicit a corner in the National Museum or Congressional Library, or you may secure a better Patent building.

In our public places we set up statues of the destroyers of mankind and erect monuments in our national cemeteries to the anonymous dead. When we go to hang garlands upon the eulogium-bearing tombs, we do not forget to scatter flowers upon the mausoleum of the unknown.

We cannot gather from the four corners of the world the bones of all the great inventors and honor them with a costly burial. Even their names have perished from the records of mankind, but their works endure. What better can we do than to gather these and guard them in our great museums, mute witnesses of antiquated arts. I can imagine these anonymous inventors looking upon us to-day and glad of this tardy recognition of their vicarious sufferings.

With loving recollection of your labors I pluck a flower from my heart and strew its petals over your neglected graves :

“ In freta dum fluvii current, dum montibus umbræ  
lustrabunt convexa, polus dum sidera pascet,  
semper honos nomenque tuum laudesque manebunt,  
quæ me cumque vocant terræ.” *Aneid 1, 607.*



## AMERICAN INVENTIONS AND DISCOVERIES IN MEDICINE, SURGERY AND PRACTICAL SANITA- TION.

BY JOHN S. BILLINGS, M. D., SURGEON U. S. A., CURATOR, UNITED  
STATES ARMY MEDICAL MUSEUM.

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In connection with this celebration of a century's work of the American Patent System, I have been requested by the Advisory Committee to prepare a brief paper upon inventions and discoveries in medicine, surgery and practical sanitation, with special reference to the progress that has been made in this country in these branches of science and art.

It would be impossible to present on this occasion such a summary as would be of any special interest or use, of the progress which has been made in medicine and sanitation during the century, either by the world at large or by American physicians and sanitarians in particular; and I shall therefore confine my remarks mainly to the progress which has been made in these branches in connection with mechanical inventions and new chemical combinations devised by American inventors—which will require much less time.

The application of the patent system to medicine in this country has had its advantages for certain people, has given employment to a considerable amount of capital in production (and to a much larger amount in advertising), has contributed materially to the revenues of the government, and has made a great deal of work for the medical profession.

So far as I know, but one complete system of medicine has been patented in this country, and that was the steam, Cayenne pepper and lobelia system—commonly known as Thomsonianism—to which a patent was granted in 1836. The right to practice this system, with a book describing the methods, was sold by the patentee for twenty dollars, and perhaps some of you may have some reminiscences of it connected with your

boyish days. I am certain I shall never forget the effects of "Composition Powder," or of "Number Six," which was essentially a concentrated tincture of Cayenne pepper, and one dose of which was enough to make a boy willing to go to school for a month.

From a report made by the Commissioner of Patents in 1849, it appears that eighty-six patents for medicines had been granted up to that date ; but the specifications of most of those issued before 1836 had been lost by fire. The greater number of patents for medicines were issued between 1850 and 1860. The total number of patents granted for medicines during the last decade (1880-1890) is 540.<sup>1</sup>

This, however, applies only to "patent medicines," properly so-called, the claims for which are, for the most part, presented by simple-minded men who know very little of the ways of the world. A patent requires a full and unreserved disclosure of the recipe, and the mode of compounding the same, for the public benefit when the term of the patent shall have expired ; and the Commissioner of Patents may, if he chooses, require the applicant to furnish specimens of the composition and of its ingredients, sufficient in quantity for the purpose of experiment. The law, however, does not require the applicant to furnish patients to be experimented on, and this may be the reason why the Commissioner has never demanded samples of the ingredients. By far the greater number of the owners of panaceas and nostrums are too shrewd to thus publish their secrets, for they can attain their purpose much better under the law for registering trade-marks and labels, designs for bottles and packages, and copyrights of printed matter, which are less costly, and do not reveal the arcanum.

These proprietary medicines constitute the great bulk of what the public call "patent medicines."

The trade in patent and secret remedies has been, and still is, an important one. We are a bitters-and-pill-taking people ; in the fried pork and salæratuſ biscuit regions the demand for such medicines is unſailing, but everywhere they are found. I

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<sup>1</sup> For these figures, and other data used in this paper I am indebted to my friend Mr. H. H. Bates, Chief Examiner in the Patent Office.

suppose the chief consumption of them is by women and children—with a fair allowance of clergymen, if we may judge from the printed testimonials. I sampled a good many of them myself when I was a boy. Of course, these remarks do not apply to bitters. One of the latest patents is for a device to wash pills rapidly down the throat.

According to the Census of 1880 there were in the United States 592 establishments devoted to the manufacture of drugs and chemicals, the capital invested being \$28,598,458, and the annual value of the product \$38,173,658, while there were 563 establishments devoted to the manufacture of patent medicines and compounds, the capital invested being \$10,620,880, and the value of the product \$14,682,494.<sup>2</sup>

A patent automatic doctor, on the principle of "put a quarter in the slot and take out the pill which suits your case," has been proposed, but this patent is said to be of Dutch and not of American origin. The idea of this may have come from Japan, for an old medicine case from that country which I possess, has four compartments filled with pills, and the label says that those in the first compartment are good for all diseases of the head, those in the second for all diseases of the body, those in the third for all diseases of the limbs, and those in the fourth are a sure vermifuge.

From the commercial and industrial point of view the great importance of patent and proprietary medicines is connected with advertising. The problem is to induce people to pay twenty-five cents for the liver-encouraging, silent-perambulating, family pills, which cost three cents. Some day I hope that the modern professional expert in advertising will favor us with his views as to the nature and character of those people who were induced to buy Jones's liver pills or Slow's specific by means of a huge display of these names on the sides and roofs of barns and outbuildings, which display forms such a prominent feature in many of our American landscapes, as seen by the traveler on the railway. I suppose there must be such people, for I have a high estimate of the business shrewdness of the men who pay for these abominations. I should also like

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<sup>2</sup>See the *Lancet*, October 5, 1889, p. 683.

to know how much a farmer gets for allowing his buildings to be thus defaced. He must be hard-up ; indeed such a display indicates that the place is probably mortgaged and that the poor man is heavily in debt.

Even the soap advertisers are not as guilty as the nostrum-makers in this particular style of nuisance, although they far exceed the latter in viciousness when it comes to applying art to ignoble purposes. The connection between progress in medicine and soap advertisements may not be clear to you, but it exists nevertheless, for many of these soaps make work for the doctors by producing skin troubles.

Upon the whole, I should think that the number of people who would take some trouble to avoid purchasing an article which is thus advertised must be rapidly increasing, so that such displays will soon be no longer profitable. The great importance of advertising does not relate to the placard or chromo business, but to its relations to periodical literature—to the daily and weekly press and the monthly magazines and journals.

To the establishment and support of some of our newspapers and journals, medical as well as others, these proprietary and secret medicines, cosmetics, food preparations, etc., have no doubt contributed largely.

I am sorry to say that I have been unable to obtain definite information as to the direct benefits which inventions of this kind have conferred on the public in the way of the cure of disease or preventing death. Among the questions which were not put in the schedules of the last census were the following, namely: Did you ever take any patent or proprietary medicine? If so, what and how much, and what was the result? Some very remarkable statistics would no doubt have been obtained had this inquiry been made. I can only say that I know of but four secret remedies which have been really valuable additions to the resources of practical medicine, and the composition of all these is now known. These four are all powerful and dangerous, and should only be used on the advice of a skilled physician. Most of such remedies have little value as curative agents, and some of them are prepared



and purchased almost exclusively for immoral or criminal purposes.

In France the sale of secret and patent medicines is not allowed unless they have been examined and approved by the National Academy of Medicine, and the same general rule holds good in Italy and Spain.

The Japanese have followed the French method, and their experience is interesting. The Central Sanitary Bureau established a public laboratory for the analysis of chemicals as a medicine. The proprietors of each of such medicines were bound to present samples, and the names and proportions of the ingredients, directions for its use and explanations of its supposed efficacy. According to a report in the *British Medical Journal*, during the first year there were 11,904 applicants for license to prepare and sell 148,091 patent and secret medicines. Permission for the preparation and sale of 58,638 different kinds were granted, 8,592 were prohibited, 9,918 were ordered to be discountenanced, and 70,943 remained to be reported on. The great majority of those which were authorized were of no efficacy, but few being remedial agents; but their sale was not prohibited, as they were not found to be dangerous to the health of the people.<sup>3</sup> I do not vouch for these figures, which throw our records entirely in the shade.

In 1849 a special committee of the House of Representatives reported to the House a bill to prevent the patenting of medicines, accompanied by a report. This bill provided that after the passage of the act letters-patent shall not be granted for any article whatever as a medicine, provided that this shall not apply to machines, instruments or apparatus. When the matter came before the House for consideration the bill was laid on the table.<sup>4</sup>

You are all aware that the great majority of the medical profession consider it to be improper and discreditable for a physician to patent a remedy. The Medical Code of Ethics declares that it is derogatory to professional character "for a physician to hold a patent for any surgical instrument or medi-

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<sup>3</sup> *British Medical Journal*, July 3, 1880, vol. ii, p. 24.

<sup>4</sup> *Congressional Globe*, March 3, 1849, p. 697.

cine ; or to dispense a secret nostrum whether it be the composition or exclusive property of himself or others. For if such nostrum be of real efficacy, any concealment regarding it is inconsistent with beneficence and professional liberality ; and if mystery alone give it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice. It is also reprehensible for physicians to give certificates attesting the efficacy of patent or secret medicines, or in any way to promote the use of them." Like all legislation, this is a formal declaration of the customs of the profession, which customs are of great antiquity. The principle upon which it is founded is thus expressed by Lord Bacon : " I hold every man a debtor to his profession ; from the which, as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto."

The rule, however, is not always adhered to by physicians, the most notable exception having been, perhaps, the use of Koch's lymph before its composition was revealed. As regards the patenting of surgical instruments and apparatus, the opinion of the great majority of physicians is in accordance with the rule just stated, but there are some who question its propriety, although they obey it—and there are few who would not use a patented instrument in a case to which they thought it was applicable.

The total number of surgical instruments and appliances patented during the past decade has been about 1,200, the patents having been in almost all cases taken out by manufacturers. With these may be classed dentists' tools and apparatus, of which about 500 have been patented during the last ten years, and in this field of invention the United States leads the world. The same may be said with regard to artificial limbs, of which our great war gave rise to many varieties.

As you know, the law prescribes that a patent may be given for a " new and useful art, machine, manufacture or composition of matter." I used to think that the word " useful " in this law had its ordinary meaning, and, therefore, wondered exceedingly as to why the Patent Office examiners allowed patents to certain things which came under my notice. One

day, however, I received an article from the Patent Office, with the request for a report as to whether it was useful in the sense in which that word was used by the Office, namely, "not pernicious or prejudicial to public interests—capable of being used"—and then for the first time I understood one of the first principles of the patent law of the United States, that is, that it does not take into consideration the degree of utility in the device, or, in other words, that "useful" means "harmless."

If a patent is granted to a medicine, it must be as a composition of matter as a special article of manufacture. The practice of the Patent Office in these matters is not generally understood. It does not now consider that medical prescriptions are inventions within the meaning of the law, or that a mere aggregation of well-known remedies to obtain a cumulative effect is a patentable composition of matter. A certain number of claims for Government protection in the form of patents or trade-marks are made for medical compounds or for apparatus, under false pretences; that is to say, the claim is for a new remedy for rheumatism or dyspepsia or displacement, with a warning against their use under certain conditions, the real design being that they are to be used under precisely these conditions in order to procure abortion, etc. These are sometimes difficult cases for the Patent Office to treat properly, for the law does not allow a large discretion for refusal on mere suspicion, and where there is ostensible and possible utility (in the Patent Office sense) it can hardly reject the claim on the ground that the invention *might* be used for immoral purposes.

I said in the beginning that I cannot on this occasion give any sufficient account of the progress of invention and discovery in medicine and sanitation during the century just gone. The great step forward which has been made, has been the establishment of a true scientific foundation for the art upon the discoveries made in physics, chemistry, and biology. One hundred years ago the practice of medicine, and measures to preserve health, so far as these were really efficacious, were in the main empirical—that is, certain effects were known to usually follow the giving of certain drugs, or the application of certain measures, but why or how these effects were produced was un-

known. They sailed then by dead-reckoning, in several senses of this phrase.

Since then not only have great advances been made by a continuance of these empirical measures in treatment, but we have learned much as to the mechanism and functions of different parts of the body, and as to the nature of the causes of some of the most prevalent and fatal forms of disease; and, as a consequence, can apply means of prevention or treatment in a much more direct and definite way than was formerly the case. For example, a hundred years ago nothing was known of the difference between typhus and typhoid fevers. We have now discovered that the first is a disease propagated largely by aerial contagion and induced or aggravated by over-crowding, the preventive means being isolation, light and fresh air; while the second is due to a minute vegetable organism, a bacillus, and is propagated mainly by contaminated water, milk, food and clothing; and that the treatment of the two diseases should be very different.

The most important improvements in practical medicine made in the United States have been chiefly in surgery, in its various branches. We have led the way in the ligation of some of the larger arteries, in the removal of abdominal tumors, in the treatment of diseases and injuries peculiar to women, in the treatment of spinal affections and of deformities of various kinds. Above all, we were the first to show the uses of anæsthetics—the most important advance in medicine made during the century. In our late war we taught Europe how to build, organize and manage military hospitals; and we formed the best museum in existence illustrating modern military medicine and surgery. Our contributions to medical literature have been many and valuable; and our government possesses the largest and best working medical library in the world. We have more doctors and more medical schools, in proportion to the population, than any other country, and while this is not good evidence of progress, I am glad to be able to say that the standard of acquirements in medical education has been, and is now rising, and our leading medical schools are now being equipped with buildings, with apparatus, with laboratories,



and most important of all, with brains, which enable them to give means of practical instruction equal to any to be found elsewhere.

As regards preventive public medicine and sanitation, we have not made so many valuable contributions to the world's stock of knowledge—chiefly because, until quite recently, we have not had the stimulus to persistent effort which comes from density of population and its complicated relation to sewage disposal and water supplies; nor have we had the information relative to localized causes of disease and death, which is the essential foundation of public hygiene, and which can only be obtained by a proper system of vital statistics. We can, however, show enough and to spare of inventions in the way of sanitary appliances, fixtures and systems for house drainage, sewerage, etc.; for the ingenuity of inventors has kept pace with the increasing demands for protection from the effects of the decomposition of waste matters, as increase of knowledge has made these known to us. The total number of patents granted for sanitary appliances during the last decade (1880-1890) is about 1,175. If good fixtures necessarily involve good plumbing work, we could easily make our houses safe so far as drainage is concerned; but a leaky joint or a tilted trap makes the best appliance worthless. The impulse to improvements in this direction has come mainly from England, where most of the principles of good work of this kind have been developed; but we have devised some details better adapted to our climate and modes of construction, and while many of the patent traps and sewer-gas excluders are only useful in the patent law sense, and some not even in that, it is nevertheless true that the safety, accessibility and good appearance of plumber's work has been largely increased during the last few years by patented inventions. Much the same may be said with regard to heating appliances, including ventilating stoves and fireplaces, radiators, etc., but I am unable to express any enthusiasm with regard to what are commonly called patent ventilators.

No doubt the greatest progress in medical science during the next few years will be in the direction of prevention, and to

this end mechanical and chemical invention and discovery must go hand in hand with increase in biological and medical knowledge. Neither can afford to neglect or despise the other, and both are working for the common good. If the American patent system has not given rise to any specially valuable inventions in practical medicine or in theology, it must be due to the nature of the subjects, and not to any fault of the system.



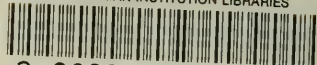








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